Environmental Protection Division

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Managed by Brookhaven Science Associates
for the U.S. Department of Energy

Memo

Date: ***March 10, 2010***

To: ***Bob Deschamps***

From: ***Benny Hooda***

Subject: ***NESHAPs Assessment for demolition of Bldgs. 704 and 802***

A National Emission Standards for Hazardous Air Pollutants (NESHAPs) assessment was completed for the removal of fan houses, underground plenums, ducts, pipes, and demolition of buildings 704 and 802. The defunct tritium evaporator facility (bldg. 802) was previously a NESHAP approved facility under the Environmental Protection Agency's permit number BNL-288-01.

The attachment I, the Facility/Process Radionuclide NESHAP Evaluation report provides the technical information about the source term. The synopsis report from CAP88-PC, version 3.0, modeling program provides a conservative estimate of the effective dose equivalent of 1.68E-02 mrem/year to the Maximally Exposed Individual (MEI) at the south southeast location.

The potential effective dose equivalent from the remedial work of the demolition, removal of plenums, ducts and pipes was below the 10 mrem/year annual limit as specified in the 40 CFR 61, subpart H, and well below the 0.1mrem/ yr. limit, which would require a NESHAPs permit. Although, the dose estimates are below the regulatory requirements, continuous ambient air monitoring for particulates should be implemented and samples analyzed for radionuclides of concern as identified in the source term.

Please contact me at 8107, if you have any questions regarding this NESHAPs assessment.

BH:

Attachments

Distribution:	S. Coleman	M. Davis	A. Lockwood	T. Jernigan
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ATTACHMENT I

FACILITY/ PROCESS RADIONUCLIDE NESHAP EVALUATION

Prepared by
Benny Hooda
March 10, 2010

1. SOURCE NAME AND LOCATION

Name(s): Removal of Fan Houses, Underground Plenum, Ducts and Pipes
Location: Bldgs. 704 and 802
Brookhaven National Laboratory
Upton, NY 11973
Latitude: N 40^0 52'
Longitude: W 72^0 53'

Building 704 (Fan House and Underground Plenum) and Building 802 (Fan House and Tritiated Water Evaporator Facility) are ancillary buildings to High Flux Beam Reactor (HFBR) located within the Brookhaven National Laboratory; which is a multidisciplinary scientific research organization in the center of Long Island, Suffolk County, New York.

2. RELEASE POINT INFORMATION

Location:	Bldgs. 704 and 802 and Surrounding Area
Release height (m):	N/A
Source Area (m^2):	N/A
Total volume (m^3):	1307
Exhaust velocity (m/sec):	N/A
Exhaust temp. (^oF):	Ambient

3. TECHNICAL INFORMATION ABOUT THE SOURCE

a. Overview of the Project

The record of decision (ROD) for the Area of Concern (AOC) 31, High Flux Beam Reactor (HFBR) includes the removal of the ancillary buildings to HFBR including the fan houses and associated contaminated soil. Building 704 houses five primary fans that discharge into a below grade exhaust duct located below the fan compartments. Building 704 is posted as a Radioactive Materials Area (RMA) and therefore radiologically controlled. Building 802 was utilized as an evaporator facility for tritiated water and houses the fans and equipment associated with it. The location of both buildings is given in Figure 1. The defunct tritium evaporator facility is an Environmental Protection Agency's NESHAP approved facility under the permit BNL-288-01. The remedial activities associated with the buildings 704 and 802 includes the dismantling and removal

of structures, systems, components, ducts, filter house inlets (above and below), resin beds, plenums, pipes, asphalt, and soil beneath the footprint of the two buildings. The soils will be sprayed with water mist, to reduce the resuspension of the soil particulates from becoming airborne during the soil excavation. The immediate vicinity of the excavation will be monitored for emissions and proper controls implemented in accordance with the Health & Safety Plan and Excavation Plan. The work would be halted if the sustained wind speeds reach greater than 20 MPH. The waste materials shall be packaged, transported, and properly disposed in accordance with Waste Management Plan. The final remediation end point of the site will be characterized and surveyed to ascertain that it is below the clean up criteria, leveled, backfilled with clean fill, properly graded and seeded.

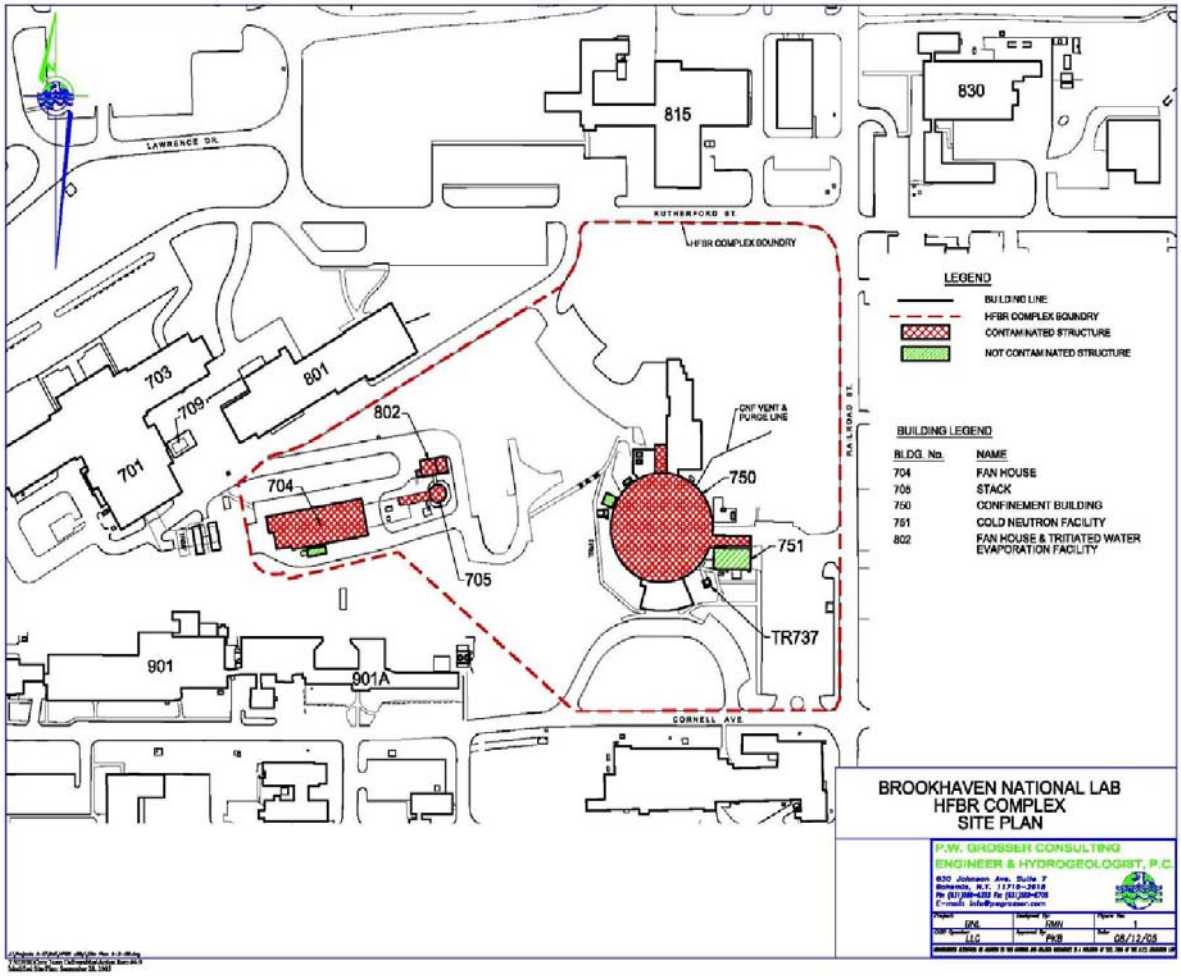

Figure 1. Location of Buildings 704 and 802.

b. Systems Description

Standard building demolition methods shall be used after electrical systems are de-energized, and all the equipment/ materials are removed from building 704 and 802. The

building structures will be demolished/ removed at a minimum of 2 feet below the grade. The excavation methods such as sloped excavation, trench boxes, and shoring will be utilized to expose the underground plenum, pipes and ducts. Excavation of soil with backhoes, excavators, cutting tools for shearing the contaminated pipes and ducts shall be utilized to remove the structures with minimum spread of radioactive airborne contamination. Soil and pipe excavation work be performed with the safety and health protection plan, work planning and controls methods and plans. Dust suppression techniques shall be utilized in soil excavation, grading, placement of clean fill, stockpiling, loading of soils and transport to reduce or eliminate the particulates from becoming airborne. The control techniques such as mist spray on soil, stop work during high winds (>20 mph), adhesives to seal the loose surface contamination, covering the stockpiles when the work is not performed, and using lid covered containers to haul materials will be utilized to reduce/minimize airborne particulates and resuspension of the dust particles. An air particulate monitoring station shall be set up in the downwind direction to collect potential airborne contaminants generated during the excavation work. The particulate filters shall be analyzed for radionuclides of concern specific to the site.

c. Source Term Development

The source term, defined as the amount of radioactive material, in grams or curies, that gets released into the environment. The source term was estimated to determine the quantities of radioactive material that potentially could be released for the purpose of estimating dose consequences to an offsite maximally exposed individual (MEI) in downwind location and to show compliance with the NESHAPs regulations.

The buildings 704 and 802 characterization data reported on the NESHAP Assessment Form was used to estimate a conservative source term during the remedial actions. The potential source term was based on the material-at-risk (MAR) that can become airborne during to excavation process and because of dust resuspension. The MAR is defined as the maximum amount of radionuclides available to be acted upon by a given physical stress (remediation activities) with certain probability for the radioactive materials to be released into the environment. The MAR values used in calculations represent the maximum quantity of radionuclides present and identified in the soil samples during the characterization activities.

The potential source was based on the following assumptions:

1. The radiological contamination is homogeneous in the media of concern.
2. Radionuclide activity listed in the Tables 1 thru 6 was properly characterized.
3. Only the identified radionuclides were of concern for emission purpose.
4. The source term is continuously released during the D& D activities.
5. Respirable fraction particle size was less than 10 μm aerodynamic equivalent diameter.
6. The respirable fraction was not corrected for the particle sizes differentiation.

7. Concrete density was 2.35 g/cm^3.
8. Soil density was 1.60 g/cm^3.
9. Dust suppression control methods were used during the remediation work to reduce/contain the source term.

Source term in curies = Activity (pCi/g) x soil density (g/cm^3) x soil volume (m^3) x 1% dispersion factor.

The following radionuclide concentrations were reported from the characterization activities.

Table 1. Building 704 Fan Cell Concrete

Radionuclides	Estimated Concrete Concentration (pCi/g)	Concrete Volume (m^3)	Concrete Density (g/cm^3)	Total Activity (Curies)	Source Term (Curies)
Sr-90	92	994	2.35	2.15E-01	2.15E-03
Cs-137	-	-	-	1.00E-01	1.00E-03

Table 2. Building 704 Underground Concrete Duct

Radionuclides	Estimated Concrete Concentration (pCi/g)	Concrete Volume (m^3)	Concrete Density (g/cm^3)	Total Activity (Curies)	Source Term (Curies)
H-3	503	994	2.35	1.17	1.17*
Sr-90	429	994	2.35	1.00	1.00E-02
Cs-137	6900	994	2.35	1.61E+01	1.61E-01
Am-241	36	994	2.35	8.41E-02	8.41E-05

*Dispersion factor for tritium was taken as one.

Table 3. Building 704 Soil

Radionuclides	Estimated Soil Concentration (pCi/g)	Soil Volume (m^3)	Soil Density (g/cm^3)	Total Activity (Curies)	Source Term (Curies)
Sr-90	33	994	1.6	5.25E-02	5.25E-05
Cs-137	217	994	1.6	3.45E-01	3.45E-05

Table 4. Building 802 Structure Debris

Radionuclides	Estimated Debris Concentration (pCi/g)	Debris Volume (m^3)	Density (g/cm^3)	Total Activity (Curies)	Source Term (Curies)
H-3	-	994	-	1.00E-02	1.00E-02*
Co-60	-	994	-	1.00E-02	1.00E-5

*Dispersion factor for tritium was taken as one.

Table 5. Stack Underground Ducts and Lines					
Radionuclides	**Estimated Concentration (pCi/g)**	**Concrete Volume (m^3)**	**Concrete Density (g/cm^3)**	**Total Activity (Curies)**	**Source Term (Curies)**
H-3	-	313	-	1.00E-01	1.0E-01*
Co-60	-	313	-	1.00E-01	1.00E-03
Ni-63	-	313	-	1.00E-01	1.00E-03
Cs-137	-	313	-	1.00E-01	1.00E-03

*Dispersion factor for tritium was taken as one.

Table 6. D/F Waste Line Building 750 to Building 801					
Radionuclides	**Estimated Concentration (pCi/g)**	**Concrete Volume (m^3)**	**Concrete Density (g/cm^3)**	**Total Activity (Curies)**	**Source Term (Curies)**
H-3	-	313	-	1.00E-01	1.0E-01*
Co-60	-	313	-	1.00E-01	1.00E-03
Ni-63	-	313	-	1.00E-01	1.00E-03
Cs-137	-	313	-	1.00E-01	1.00E-03

* Dispersion factor for tritium was taken as one.

d. Dose Assessment

The radiological dose and risk assessment to the maximally exposed individual (MEI) was estimated using the Clean Air Act Code CAP88-PC, version 3.0 modeling program to show compliance with 40CFR 61.93 (a). The meteorological data (temperature, precipitation, and wind speed) used in the modeling program was site specific.

The dose estimates in CAP88-PC are applicable to low-levels of chronic exposures and not for the short term or acute exposures; therefore, it was assumed that the low-level emissions were continuous over the course of a year. The plume rise momentum was assumed to be zero meters/sec (exit velocity) as it was an area source and emissions were not via stationary stack or duct.

The following agricultural assumptions were used: all vegetables were imported from other markets and locally grown crops were not a factor as it was an area source term. Therefore, the default values given in the CAP88-PC model program were used in the dose assessment. Because Suffolk County does not have any dairy and cattle farms, 100 percent of milk and meat was imported from outside of the assessment area.

The effective dose equivalent to the MEI from the remediation project of building 704 and 802 was estimated to be 1.68-02 mrem in a year at the south southeast location. The potential dose was well below the 10 mrem/year annual limit as specified in the 40 CFR 61, subpart H, and below the 0.1mrem/ yr. limit, which requires a NESHAPs permit. Also, the remediation projects are exempt under CERCLA from the permit requirements.

Although, the dose estimates are well below the regulatory NESHAP requirements, the emissions control methods such as the application of fixative to stabilize dispersible contamination, spray water mist to control dust generation, and containment of the liquids found in underground ducts should be implemented. Also, dust generation during cutting, excavation and packing of materials should be avoided. A continuous air monitoring station for particulates should be set up in the downwind direction to record particulate activity released during the remediation work. Ambient air particulate filter samples shall be collected on weekly basis with a sampling flow rate of > 2 cfm, and subsequently analyzed for the radionuclides of concern based on the source term. The results of the analyses shall be reported to the Environmental Compliance Representative for project.

Attachment II

C A P 8 8 - P C

Version 3.0

Clean Air Act Assessment Package - 1988

S Y N O P S I S R E P O R T

Non-Radon Population Assessment
Mar 10, 2010 02:30 pm

Facility: Building 704 and 802 demolition, Underground Duct
Address: Brookhaven National Laboratory
HFBR Remediation
City: Upton
State: NY Zip: 11973

Source Category: Area
Source Type: Area
Emission Year: 2010

Comments: Demolition and removal of Bldg.704
Bldg. 802 (EPA permit BNL-288-01)

Effective Dose Equivalent (mrem/year)
1.68E-02

At This Location: 1400 Meters South Southeast

Dataset Name: NESHAP2010_1
Dataset Date: 3/10/2010 2:27:00 PM
Wind File: Z:\CAP88PC2\CAP88PC2\WNDFILES\BNL00.WND
Population File: Z:\CAP88PC2\CAP88PC2\POPFILES\BNL10.pop